



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,834	08/07/2001	Robert F. Darveaux	M-10966 US	1262
22888	7590	01/27/2005	EXAMINER	
BEVER HOFFMAN & HARMS, LLP TRI-VALLEY OFFICE 1432 CONCANNON BLVD., BLDG. G LIVERMORE, CA 94550			ERDEM, FAZLI	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 01/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/923,834

Applicant(s)

DARVEAUX ET AL.

Examiner

Fazli Erdem

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-47 is/are allowed.
- 6) ☒ Claim(s) 48 and 49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Allowable Subject Matter***

1. Claims 1-47 allowed

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 49 rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (5,977,616) in view of view of Kajihara (5,616,957) further in view of Zhang et al. (2002/0171144)

Regarding Claim 49 Wang et al. disclose a thermally and electrically enhanced PBGA package which includes a substrate having a die adhere on it. The die and the substrate are interconnected by means of signal transferring means. Solder bumps are formed on the bottom side surface of the substrate. Molding compound is encapsulated among the substrate, the die and a heat spreader. A heat spreader is arranged over the top surface of the substrate. The heat spreader includes a plane having four supporting members that are set on the bottom side of the plane and at the corners of the plane. The supporting members are protruded from the plane to connect the heat spreaders and the substrate. The heat spreader further includes a protruded portion. A further supporting member is formed on the central portion of the protruded portion. The substrate has a die paddle formed for receiving die. A power ring is formed around the die

Art Unit: 2826

paddle on the surface of the substrate for power unit. A ground ring formed around the power ring on the substrate has ground pads. The supporting members of the heat spreader are connected on the ground pads by using the heat spreader attach material. Wang et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die and the required metal ring. However, Kajihara discloses a plastic package type semiconductor device where the required encapsulation structure is disclosed in Figure. 2. Furthermore, Zhang et al. disclose a die-up ball grid array package with a heat spreader and method for making the same where in claim 16 the required metal ring is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure and the metal ring in Wang et al. as taught by Kajihara and Zhang et al. respectively, in order to have a semiconductor packaging structure with better reliability.

3. Claim 48 rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Hawthorne et al. (6,008,991) further in view of Kajihara (5,616,957) further in view of Yalamanchili (5,929,514)

Regarding Claim 48, Wang et al. disclose all the claimed subject matter, except the thermally conducting adhesive. However, Hawthorne et al. disclose an electronic system including packaged integrated circuits with heat spreading standoff support members where the thermally conducting adhesive is shown. Wang et al. and Hawthorne et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die and the required thermal conductive adhesive. However, Kajihara discloses a plastic package type semiconductor device where the required encapsulation structure is disclosed in Fig. 2.

Art Unit: 2826

Furthermore, Yalmanchili discloses a thermally enhanced lead-under-paddle IC leadframe where in column 5, lines 8-20 the required thermal conductive adhesive structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure and the thermal conductive adhesive structure in Wang et al. and Hawthorne et al. combination as taught by Kajihara and Yalamanchili, respectively in order to have a semiconductor packaging structure with better reliability.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fazli Erdem whose telephone number is (571) 272-1914. The examiner can normally be reached on M - F 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 09/923,834

Page 5

Art Unit: 2826

FE

January 21, 2005

  
NATHAN J. FLYNN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800